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TWO NEW RODENTS FROM THE MIOCENE OF MONGOLIA[1]

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Dr. Walter Granger recently turned over to me for study a small collection of rodents from the Miocene Tung Gur Beds of Mongolia. I wish to express my gratitude to him for the permission to study these forms, which have supplied interesting links in the evolutionary picture of two families of rodents. The two animals represented belong to distinct groups, the dipodids and the *Siphneus*-group of cricetids. This is the earliest recorded occurrence of either group.

Protalactaga tunggurensis, new species

Figure 1, A–C

HOLOTYPE.—Amer. Mus. No. 26553, jaw with incisor and M_1 left.

PARATYPE.—Amer. Mus. No. 26546, a maxilla with P^4–M^2 right.

HORIZON AND LOCALITY.—Upper Miocene Tung Gur Beds, Wolf Camp, Mongolia.

DIAGNOSIS.—M_1 distinctly less progressive than in *P. grabaui*, the cusps and crests arranged in opposite pairs, instead of there being a union of the entoconid, metaconid, protoconid and the crests that Schaub calls "mesostylidsporn" and "G" in a single point; anterioconid of varying size; contrast in pattern between M_1 and M_2 not as strong as in *P. grabaui;* P^4 present but reduced; upper molars distinctly cricetine in appearance.

This species is distinctly more primitive than the genotype, which comes from the Pontian of north China. The first lower molar (Fig. 1A), as indicated in the diagnosis, shows very little of the antero-posterior fusion which progressively affected this tooth in the dipodids (Schaub, 1934, Figs. 18–23). Since this compression was a progressive character among the dipodids, this species should represent the most primitive known stage of the family. The tooth consists of a series of transverse crests: the most posterior formed by the hypoconid and hypoconulid; a central one formed by the entoconid and the crest that Schaub has called "G"; the most anterior formed of the protoconid and the crest Schaub has identified as the "mesostylidsporn." Anterior of this is a metaconid, which connects via an antero-posterior crest with the center of this anterior cross-crest, instead of being an isolated cusp, as in *P. grabaui* (Schaub, Fig. 18). The most anterior tip of the tooth is

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a small cusp which seems to represent an anteroconid, and which is connected via a narrow crest with the metaconid.

Another specimen (Amer. Mus. No. 26545, Fig. 1B) consists of the right lower jaw with all three cheek teeth. These have been so badly worn that very little is determinable of the details of the pattern. In M_1, however, all of the cusps of the holotype seem to be identifiable, the chief outstanding differences being the smaller size of the entire tooth and of the anteroconid in the referred specimen. This size difference is

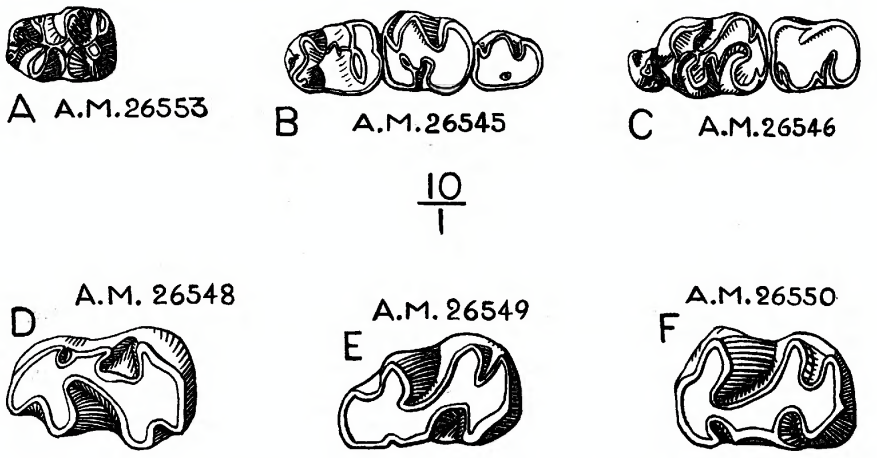

Fig. 1. Rodent teeth from the Tung Gur Beds of Mongolia.

A. *Protalactaga tunggurensis*, n. sp. Holotype. Amer. Mus. No. 26553, M_1 left.

B. *P. tunggurensis*, n. sp. Amer. Mus. No. 26545, M_{1-3} right.

C. *P. tunggurensis*, n. sp. Paratype. Amer. Mus. No. 26546, P^4–M^2 right.

D. *Prosiphneus lupinus*, n. sp. Holotype. Amer. Mus. No. 26548, M_1 right.

E. *P. lupinus*, n. sp. Amer. Mus. No. 26549, M_1 left.

F. *P. lupinus*, n. sp. Amer. Mus. No. 26550, M_2 left.

All figures × 10

over ten per cent in total length (see table p. 4). In the referred specimen, the anteroconid, in addition to being small, is not connected with the metaconid as in the holotype. These differences may or may not be correlated with others sufficient to make these forms distinct species. For the present, however, they will be considered specifically identical. The other molars of this specimen are also highly worn. They show the usual alternation of the main cusps, but indicate that the accessory crests were by no means as well developed as in M_1. This is in agree-

ment with *P. grabaui*, where there is an even greater contrast in pattern between M_1 and M_2. In M_2, a short crest may be seen extending lingually from about the center of the protoconid. This would seem, from its position, to be the posterior arm of the protoconid, although Schaub interprets the similarly placed crest in *P. grabaui* as a "mesostylidsporn." The large posterior lobe would seem to have consisted of a widely separated entoconid and hypoconulid, as in *P. grabaui* (Schaub, Fig. 18). The general appearance of M_3 would indicate that there may well have been a similar development of the posterior arm of the protoconid in that tooth when it was less worn. The buccal margin of the anterior cingulum in the two posterior molars is widely separated from the protoconid, more so than in *P. grabaui*, whereas the lingual margin is either aborted or fused with the metaconid, as in the latter form.

The pattern of the upper teeth is much nearer to that of *Plesiosminthus schaubi* (Schaub, Fig. 24) than to that of *Alactaga* (*op. cit.*, Fig. 25). The primary cusps, however, are larger than in *Plesiosminthus*. The upper premolar, although exceptionally small, nevertheless shows several details. There is a main central cusp, continued into a point, postero-internally. Anterior of this point is a small cuspule, while at the opposite side of the tooth is another small one. M^1 has a relatively typical cricetid-like pattern. Due, presumably, to the presence of the premolar, there is no anterocone. The anterior arm of the protocone is continued into a crest as in *Paralactaga* (Schaub, Pl., Fig. 5), probably in part of cingular origin. The protocone is distinctly anterad of the paracone, more so than in *Paralactaga*. The hypocone is connected with the paracone by a diagonal crest, while the protocone is left almost completely isolated. In the Pontian form, the crest from the hypocone unites rather with the mesoloph. The mesoloph is represented by a short crest running buccad along the central valley from the paracone-hypocone crest. It looks as if this form represents the initial step toward the union of the paracone and mesoloph which Schaub has pointed out as occurring in *Alactaga*. This is particularly well shown in M^2, where the two are very closely approximated. The valley behind the mesoloph is exceedingly long, widely separating the metacone from the hypocone. The posterior cingulum is free at both ends. The second molar is badly worn, showing no characters noticeably different from those of the first. In general, the pattern of the upper molars is distinctly suggestive of that of *Paralactaga*, although it is very much more primitive and cricetid-like.

The maxilla that is preserved shows the beginning of the infraorbital foramen, which seems to have been large and low, the inferior border of the foramen apparently being nearly as low and as horizontal as in the modern dipodids. Another specimen, Amer. Mus. No. 26547, consists of a premaxilla with an incisor. This last is without any trace of grooving or ridging or any other peculiarities. It is of about the right size to go with the other specimens referred to this species.

In the lower jaw, there are a number of interesting features. The mental foramen is very high on the jaw, being almost in the diastema

	Protalactaga		
	Amer. Mus. No. 26546	Amer. Mus. No. 26553	Amer. Mus. No. 26545
P^4 antero-posterior	0.36	..	..
transverse	0.52	..	..
M^1 antero-posterior	1.40	..	..
width protoloph	0.98	..	..
width metaloph	1.00	..	..
M^2 antero-posterior	1.14	..	..
width protoloph	0.93	..	..
width metaloph	0.85	..	..
M_1 antero-posterior	..	1.40	1.23
width metalophid	..	0.83	0.74
width hypolophid	..	0.92	0.90
M_2 antero-posterior	..	..	1.15
width metalophid	..	..	0.95
width hypolophid	..	..	0.90
M_3 antero-posterior	..	..	0.85
width metalophid	..	..	0.70
width hypolophid	..	..	0.61

instead of on the side of the mandible. Correlated with this, the jaw looks as if the molars had been shoved forward, compressing the diastema from rear to front. The anterior end of the masseteric fossa is below the anterior end of M_1, and ends in a rather steep knob. There is a deep groove, which Schaub has called the "dipodid groove," between the coronoid process and M_3. The mandibular foramen is at the rear of the groove, as it is in *Protalactaga* (Schaub, p. 14). All of these are dipodid characters.

This animal, therefore, clearly represents a dipodid, in the presence of the dipodid groove of the mandible, the close approximation of the paracone and mesoloph of the upper molars, and the great development of the crest in M_1 which has been called "G." This assemblage of char-

acters is not found in any other rodents, so that there can be no question of the correctness of the reference of this animal to the Dipodidae. The lack of antero-posterior compression of M_1, the distinctly low-crowned and cuspidate nature of the teeth, and the striking contrast in pattern between M_1 and M_2 all tend to unite this form with *Protalactaga*. The present form is set off from *P. grabaui*, however, by the lesser degree of compression of the first lower molar, the presence of a distinct antero-conid, and by the fact that the metaconid is united with the other cusps, instead of being an independent entity. The presence of an upper premolar indicates that this is a relatively primitive form, being separated in this respect from *Dipus*.

Prosiphneus lupinus, new species[1]

Figure 1, D–F

HOLOTYPE.—Amer. Mus. No. 26548, fragment of a lower jaw with M_1 right.

PARATYPES.—Amer. Mus. No. 26549, M_1 left; and Amer. Mus. No. 26550, M_2 left.

HORIZON AND LOCALITY.—Upper Miocene Tung Gur Beds, Wolf Camp, Mongolia.

DIAGNOSIS.—Differs from other species of genus in valleys of less uniform size; lophs less regular; teeth much lower crowned; central external lobe of lower molars with very straight edge, marked off at either end by sharp angles.

This species is quite distinct from any previously described member of the genus. It differs from the figures given by Schlosser, Teilhard, and Teilhard and Young in that the anterior lobe of M_1 is acute externally, instead of being rounded. The antero-external valley is larger and the postero-internal one smaller (Fig. 1, D-F). There is no evidence of the thinning and reduction of enamel which is suggested by Schlosser's figures (Pl. III, fig. 8*a;* no such thinning is indicated by Teilhard and Young, Pl. v, figs. 1–5). The posterior crest is large in *P. lupinus*, and the antero-internal fold is more emphasized. The square buccal end of the central fold is very clearly shown on all five teeth in the present collection, and does not seem to occur in any of the other species of the genus.

In M_2 the lophs, especially the first and third, are less regular and microtine-like than in the later species. The dams across the valleys are clearly shown on all teeth, though none of them are as highly worn as some of Schlosser's specimens. The antero-internal valley is larger and the postero-internal one smaller in this species. The two external valleys are larger. The crowns of the teeth of this form are very much lower than in any other form referred to *Prosiphneus*, the roots being about

[1] The specific name is derived from the locality where these fossils were found.

twice as long as the crowns, whereas Schlosser states that the two sections are of approximately equal elevation, and Teilhard and Young's figures would seem to indicate a much greater height of crown.

Schlosser originally referred *P. eriksoni* to *Siphneus*, but Miller, in his revision of Schlosser's determinations, pointed out that *Siphneus* has rootless, prismatic teeth, whereas this form has clearly defined roots, and hence he separated *S. eriksoni* as a distinct genus, *Myotalpavus*. Previously, however, Teilhard (1926) had described *Prosiphneus*, with *P. licenti* as genotype. Teilhard and Young referred *S. eriksoni* to this genus, as well as describing two additional species. There seems to be little question that all of these forms with rooted teeth are congeneric

While the *Siphneus* pattern is clearly forecast in *Prosiphneus*, there are considerable differences in detail in addition to the difference in the height of the crowns. These are most clearly shown in *P. lupinus*.

As is the case with the *Protalactaga* described above, this species is sufficiently distinct from the previously described species of the genus (especially in the much shorter crowns) to approach close to, if not to exceed, the limits of a single genus. It seems best, however, for the present to continue to refer both of these Tung Gur forms to the Pontian genera.

Prosiphneus lupinus

	Amer. Mus. No. 26548 Holotype	Amer. Mus. No. 26549	Amer. Mus No. 26550
M_1 antero-posterior	2.28	2.15	..
width metalophid	1.28	1.14	..
width hypolophid	1.53	1.37	..
M_2 antero-posterior	..	..	2.25
width metalophid	..	..	1.45
width hypolophid	..	..	1.51

In age, these beds, as indicated by the present fauna, seem to be Upper Miocene, with a possibility of their being Upper Middle Miocene. Both rodents herein described are referred to genera described from the Pontian, but both forms are species much more primitive than the previously known members of their genera. The difference in specialization is such that the Tung Gur Beds would seem not to be later than the middle of the Upper Miocene. This determination, of an Upper Miocene age, is born out by the only other rodent described from these beds, which Stirton has referred to the Upper Miocene genus *Amblycastor*.

The specimens of *Protalactaga* are of considerable phyletic importance, in that they enable the dipodid pattern to be carried back one stage nearer the cricetid pattern from which it appears to have been derived. Although *P. tunggurensis* is far from possessing a normal Cricetid pattern, nevertheless, in all those characters in which it differs from *P. grabaui* it approaches nearer to the *Cricetodon* type of tooth, and enables us to hope that Upper Oligocene and Lower Miocene deposits will yet yield the forms to fill out the picture that Schaub has so ably outlined.

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